



# National Institute of Standards & Technology

## Certificate of Analysis

### Standard Reference Material<sup>®</sup> 1768

#### High-Purity Iron

(In Cooperation with the American Society for Testing and Materials)

This Standard Reference Material (SRM) is in the form of a disk approximately 31 mm (1.25 in) in diameter and 19 mm (0.75 in) thick, intended for use in optical emission and X-ray spectrometric methods of analysis.

Table 1. Certified Mass Fractions [1]

Element	( in % )
Aluminum	0.0024 ± 0.0003
Carbon	0.0010 ± 0.0002
Cobalt	0.0025 ± 0.0004
Copper	0.0006 ± 0.0001
Manganese	0.0014 ± 0.0005
Nickel	0.0014 ± 0.0004
Nitrogen	0.002 ± 0.001
Oxygen	0.036 ± 0.003
Phosphorus	0.0013 ± 0.0004
Sulfur	0.0003 ± 0.0001

The certified value listed for an element is the present best estimate of *true* value based on the results of the cooperative program for certification. The estimated uncertainty listed for an element is based on judgment and represents an evaluation of the combined effects of method imprecision, possible systematic errors among methods, and material variability. No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most elements.

The overall coordination of the technical measurements leading to certification was performed under the direction of J.I. Shultz, Research Associate, ASTM/NIST Research Associate Program.

The technical and support aspects involved in the original preparation, certification, and issuance of this SRM were coordinated through the NIST Standard Reference Materials Program by P.A. Lundberg. Revision of this certificate was coordinated through the NIST Standard Reference Materials Program by N.M. Trahey.

*This Certificate of Analysis has undergone editorial review by N.M. Trahey of the NIST Standard Reference Materials Program to reflect program and organizational changes at NIST and the Department of Commerce. No attempt was made to reevaluate the certificate values or any technical data presented on this certificate.*

Gaithersburg, MD 20899  
Certificate Issue Date: 05 October 2000  
*See Certificate Revision History on Last Page*

Nancy M. Trahey, Chief  
Standard Reference Materials Program

## PLANNING, PREPARATION, TESTING, AND ANALYSIS

The material for this SRM was provided under a contract with T.R. Linde. Homogeneity testing was performed at NIST by J.A. Norris.

Cooperative analyses for certification were performed in the following laboratories:

B. Berglund, AB Sandvik Steel, Sandviken, Sweden

C.K. Deak, Analytical Associates, Inc., Detroit, MI

F.A. Pennington, Jr., R.F. Eakin, J.E. Fickel, M.P. Royer, and S.M. Goldinger, Andrew S. McCreath & Son, Inc., Harrisburg, PA

C.C. Borland, D.E. Gillum, H.P. Vail, G.D. Smith, G.R. Doeblor, and T.M. Minor, Armco Research & Technology, Middletown, OH

H. Umans, Hoogovens Groep BV, IJmuiden, Netherlands

C.L. Maul, E.W. Hobart, and E.P. Kehoe, Ledoux & Co., Teaneck, NJ

L.W. Ollila, Luvak, Inc., Boylston, MA

S. Kasai and M. Saeki, Nippon Steel Corporation, Inspection & Analysis Department, Kimitsu Works, Kawasaki, Japan

Elements other than those certified may be present in this material as indicated below. These are not certified but are given as additional information on the composition.

Table 2. Non-Certified Mass Fractions

Element	Concentration ( in mg/g)	Element	Concentration ( in mg/g)
Antimony	(< 1.0)	Niobium	(< 5.0)
Arsenic	(< 1.0)	Selenium	(< 1.0)
Bismuth	(< 4.0)	Silicon	(< 10.0)
Boron	(< 2.0)	Tantalum	(< 1.0)
Cadmium	(< 1.0)	Tellurium	(< 1.0)
Calcium	(< 1.0)	Tin	(< 1.0)
Chromium	(< 2.0)	Titanium	(< 10.0)
Lead	(< 1.0)	Tungsten	(< 2.0)
Magnesium	(< 6.0)	Vanadium	(< 1.0)
Molybdenum	(< 3.0)	Zinc	(< 1.0)
		Zirconium	(< 1.0)

Table 3. Methods/Techniques Used

Element		Method/Technique	
Aluminum		c,d,e,f	
Carbon		a,b	
Cobalt		c,d,e,f	
Copper		c,d,e,f	
Manganese		c,d,e,f	
Nickel		c,d,e,f	
Nitrogen		g,i	
Oxygen		i	
Phosphorus		c,d,e,f,g	
Sulfur		a,g,h	
a	Combustion-Infrared Detection	f	Spark Source Mass Spectrometry
b	Combustion-Conductimetry	g	Spectrophotometry
c	Atomic Absorption Spectrometry	h	Combustion-Titrimetry
d	Inductively Coupled Plasma Spectrometry	i	Combustometric
e	DCPlasma Spectrometry		

#### REFERENCE

- [1] Taylor, B.N., "Guide for the Use of the International System of Units (SI)," NIST Special Publication 811, 1995 Ed., (1995).

<b>Certificate Revision History:</b> 05 October 2000 (This revision reflects a correction in disk diameter and editorial changes.); 06 December 1991 (Original certificate date).
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*Users of this SRM should ensure that the certificate in their possession is current. This can be accomplished by contacting the SRM Program at: telephone (301) 975-6776; fax (301) 926-4751; e-mail [srminfo@nist.gov](mailto:srminfo@nist.gov); or via the Internet <http://www.nist.gov/srm>.*